



Office of Energy Efficiency  
and Renewable Energy

# Advanced Petroleum-Based Fuels in a Compression-Ignition Direct-Injection Engine

## Background

The Partnership for a New Generation of Vehicles (PNGV) has identified the compression-ignition direct-injection (CIDI) diesel engine as a prime candidate to achieve the goal of 80 miles per gallon. While CIDI engines offer substantial efficiency advantages over other types of engines, substantial reductions in emissions of oxides of nitrogen ( $\text{NO}_x$ ) and particulate matter are needed to achieve PNGV goals. The U.S. Department of Energy's Office of Transportation Technologies is assessing the benefits of advanced petroleum-based fuels and blends for reducing vehicle emissions.



*Compression-Ignition Direct-Injection Engine*

## Accomplishments

- ◆ Three advanced petroleum-based fuels demonstrated lower particulate matter emissions without higher  $\text{NO}_x$  emissions.
- ◆ Emissions can be reduced with no loss in energy efficiency.

## Benefits

- ◆ An electric hybrid vehicle using an advanced CIDI engine operating on these fuels can achieve three times the fuel economy at the same emissions levels as a comparable gasoline-fueled vehicle.
- ◆ Some of these fuels can be derived from non-petroleum sources or the large domestic natural gas reserve, reducing dependence on imported oil.

## Future Activities

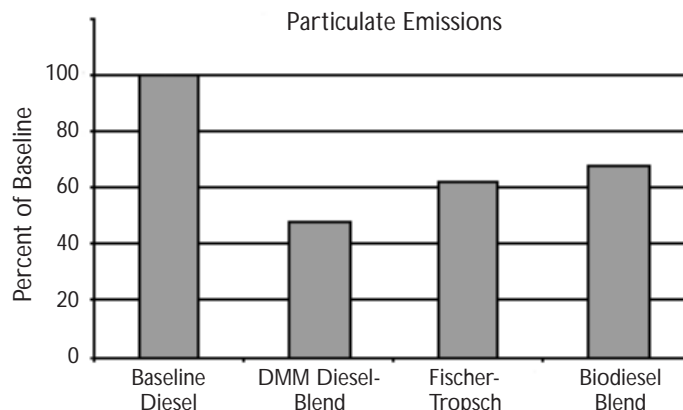
- ◆ Optimize the engine to new fuels for greater efficiency and lower emissions.
- ◆ Determine the effect of lube oil on advanced diesel engine emissions.
- ◆ Determine the effects of particulate matter from advanced fuels.
- ◆ Determine which oxygenates and what amounts should be blended with petroleum-based fuels to reduce emissions further.

## Partners in Success

Southwest Research Institute

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